DEPARTMENT OF AGRICULTURE,

TANGANYIKA TERRITORY.

IMPERIAL BUREAU
10 OCT. 1923
OF MYCOLOGY

Report

FOR THE YEAR 1922.

PRINTED BY
WATERLOW AND SONS LIMITED, LONDON WALL, LONDON.
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ESTABLISHMENT AND GENERAL ORGANISATION.

1. The staff during the year was as follows :—

Director	A. H. Kirby	Dar es Salaam.
Deputy Director ...	H. Wolfe	,,
Entomologist ...	A. H. Ritchie	Morogoro.
Senior District Agricultural Officer.	D. Prain	Lindi, Bagamoyo.
District Agricultural Officers :	E. Brand	Utete.
	R. J. Lathbury... ...	Moshi.
	A. Pitcairn	Tabora, Shinyanga.
	O. E. Whitehead ...	Bagamoyo, Lindi.
	A. E. Haarer	Morogoro.
	L. C. Edwards	Mwanza.
Plant Import Inspector	A. R. Hildebrand ...	Tanga.
Head Gardener, Dar es Salaam.	T. H. Marshall ...	Dar es Salaam.
Chief Clerk	W. E. Pownall... ...	,,
Clerk	A. L. B. Bennett, D.F.C.	,,

Biological and Agricultural Institute, Amani :—

Director	A. Leechman, M.A. (Oxon), F.L.S., F.C.S., F.E.S.	Amani.
Assistant Director ...	(Vacant).	
Head Gardener ...	F. M. Rogers	,,

2. The Asiatic staff consisted of :—

2nd Grade Clerk ...	J. P. Santa Rita ...	Transferred to Mpanganya Agricultural Station, and continued to be stationed there.
3rd ,, ,, ...	C. O. Cordeiro	Dar es Salaam (until Aug. 13th).

3rd Grade Clerk ...	J. B. de Souza	Dar es Salaam (from Aug. 9th).
Assistant Gardener, Amani.	V. Jansz	Amani.
Laboratory Assistant, Amani.	Raden Soleman ...	,,

3. The African staff consisted of :—

Clerk	Mdachi b. Scharifu ...	Amani.
,, ...	Bury Thomas	,, (from Feb. 16th).

4. Officers were absent from station on duty as follows :—

	No. of Nights.
Director	172
Deputy Director	12
Entomologist	78
Senior District Agricultural Officer	77*
District Agricultural Officer, Utete	177
,, ,, ,, Moshi	92†
,, ,, ,, Tabora and Shinyanga ...	156
,, ,, ,, Bagamoyo and Lindi ...	213
,, ,, ,, Morogoro	82
,, ,, ,, Mwanza	203
Plant Import Inspector	19
Head Gardener, Dar es Salaam	7

As only one officer is available for the Morogoro and Mpanganya Agricultural Stations (see below), respectively, the necessary travelling in the district has caused to be small the extent of experimentation at these stations; although the attempt has been made to carry out as much useful work as possible.

5. Native agricultural instructors were employed in the various districts as follows :—

District.	Maximum.	Minimum.
Bagamoyo	7	5
Bukoba	1	0
Dar es Salaam	1	0
Kilwa	3	1
Lindi (including Mikindani)	2	1
Mahenge	1	1
Morogoro (including Kilosa)	4	3
Moshi	4	1
Mwanza	12	7
Pangani	1	1
Shinyanga (including Tabora)	3	1
Utete (including Mohoro)	4	3
Totals	43	24

* On leave, February to August.

† Including 45 nights for a tour to Kenya for coffee instruction.

6. The organisation of the work with the small staff has been in accordance with the policy of concentrating activities in the districts where facilities for the readiest development exist, and on the crops of principal usefulness. Conditions are such that among these crops cotton has received the greatest amount of attention, as will be plain from the record which follows.

7. As soon as possible after his arrival, the Director proceeded on a tour lasting from February 13 to May 16 through the Central Railway districts as far as Tabora, then through Mwanza and Bukoba, Tanga, Moshi and Arusha, passing on his way from Bukoba to Tanga through Uganda and Kenya where he had the advantage of seeing and discussing matters of mutual interest and activity with the Agricultural Authorities of those Dependencies. A second tour, from June 4th to July 24, was made through the Lindi, Kilwa, Rufiji and Dar es Salaam Districts, the agricultural conditions of the Lindi and Rufiji Districts receiving special attention. The Bagamoyo, Pangani and Tanga Districts were given similar detailed attention from August 30th to September 29th. The matters connected with these tours were dealt with in a preliminary report on the agriculture of the Territory.

8. The activities of the Department have been greatest in connection with cotton, in all districts except Moshi and Arusha, where coffee production, and to a smaller extent that of chillies, has been the chief object of the work. Notwithstanding the circumstance that it has not been possible to station an Agricultural Officer in Bukoba, Kilwa, Dar es Salaam and Mahenge, instructors (as is indicated in the list above) have worked there under the Administrative Officers concerned; chiefly with coffee and chillies in Bukoba, and cotton in Kilwa, Dar es Salaam and Mahenge, the work in the last-mentioned district possessing particular promise as will be shown below.

9. The removal of the offices at headquarters to the building erected during German occupation as an agricultural building, and used temporarily as Government House, was carried out in October. This has provided accommodation particularly well suited to the activities of the central organization of the Department and has enabled those of the Botanic Gardens to be extended and drawn into close connection with it so that they may be used to the best degree and advantage both for internal and external work. The increased accommodation has also enabled the Library (which contained 357 books and 487 pamphlets at the end of the year) to be reorganised for the greatest availability and usefulness of its contents, and definite work to be begun for assembling and exhibiting material for an Agricultural Museum. Room has been reserved in the building for a Game Museum and a Forestry Museum; and it is hoped that it will be possible for the work to be carried out for these in close connection and co-operation with that for the Agricultural Museum.

AGRICULTURAL INSTRUCTION AND EDUCATION.

10. The tours of Agricultural Officers have instruction in husbandry, combined with the supply of good planting material, for their chief object; and the work is extended and made continuous by the employment of agricultural instructors. The tables contained in paragraphs 4 and 5 above, indicate the proportion of time that has been given by such officers for direct instruction in their districts outside of their stations, and the extent to which instructors have been employed in the different areas. At Morogoro and Mpanganya the existence of agricultural stations has made it possible to call in native chiefs and people for practical demonstrations; and advantage has been taken of this. In the districts of Bagamoyo and Moshi, instruction in cotton growing, picking and grading was given in co-operative plots.

11. At Morogoro Station four pupil instructors from Tabora and Mahenge have been in residential training since June, and are reported to have shown good progress; there is considerable difficulty in obtaining an adequate number of boys to undergo this training, owing to their inability to appreciate that their position is one of apprenticeship, with its provision of shelter, food and subsistence money rather than wages, and its conditions of discipline; and to realise that the future holds promise of definite occupation in work for increasing wages. In addition to these pupil instructors two pupil teachers from Morogoro School have been undergoing training, and have attended regularly at the Station since the middle of August.

12. School gardens have received assistance by the provision of seed and through inspection and advice. Distribution of seed to these gardens was effected through the Educational Department, except that cotton seed was supplied directly for cotton growing by elementary pupils at Utete (Rufiji). Visits to school gardens for inspection and advice were made by Agricultural Officers in the districts of Shinyanga, Tabora, Morogoro and Utete. At the last-mentioned place the pupils were given lessons and practical instruction by the District Agricultural Officer in their garden.

IMPROVEMENT AND EXTENSION OF CROP PRODUCTION.

13. The efforts toward this have been made chiefly in the direction of teaching by agricultural officers and instructors, and by the distribution of planting material, especially of improved kinds and varieties. Further, the improvement of cotton production is forming the subject of particularised work by the Cotton Specialist of the Empire Cotton Growing Corporation, Mr. R. C. Wood, and his Assistant, Mr. R. M. Nattrass, who arrived in the Territory in July; the results of preliminary examination of cotton by them are given in the next paragraph. The distribution of seeds, etc., is summarised in Appendix I. Provision for material for distribution is made in two ways: from agricultural funds or by advances by the Treasury, usually on repayment. By far the greatest share in the distribution of seed to natives is naturally taken by cotton; and for the year under report this was as follows,

the figures for 1921 being given for comparison, and those for 1923 being also included for the same purpose, although they will actually belong to the Report for the latter year :—

District.	1921.	1922.	1923.*
	tons.	tons.	tons.
Arusha	none	½	2¾
Bagamoyo	6	10	25
Bukoba	6	3½	2
Dar es Salaam	½	2½	6
Dodoma	none	⅓	none
Kigoma	none	1½	3
Kilwa	15	19	20
Kondoa Irangi	none	5	none
Lindi	30	37	113
Lushoto	none	1½	¾
Mahenge	none	1¼	5
Morogoro	26	14	84
Moshi	none	⅓	3½
Mwanza	30	130	140
Pangani	¼	1	5
Rufiji	4½	60	70
Tabora	1½	9	10
Tanga	none	½	¾
Tukuyu	¼	none	none
Total ...	120	297	490¾

* Estimated.

14. *Special Cotton Work.*—The Cotton Specialist supplied reports on 35 samples altogether : 25 from cotton as ordinarily grown, and 10 from plant selections by Agricultural Officers. Three samples from Moshi (see par. 49) showed that the cotton was of very mixed origin, but that much of it was good in staple and noticeably soft; seven samples from different areas at Lushoto (par. 54), although too small for thorough examination, showed remarkable softness, and exceptional length in some cases, strength and colour being also good in spite of mixed origin; three samples from Mahenge (par. 53), indicated mixed origin, but in the first grade the length and colour were good and the lint soft and silky, and the second grade, although presenting the usual great variation in length and being much stained, contained a fair proportion of good lint, the general conclusion being that Mahenge can grow excellent cotton; nine samples from the Tanga experiment plots (par. 51), gave Mnyusi, Muheza, Moa and Mahengo, in order, for fair cotton, the rest being poor; one sample from Mkalama (par. 65), contained the usual mixed product, which was dirty, stained and immature; a sample of plantation grown cotton from Tukuyu gave the usual variation in length, but the strength and colour were good; lastly one sample fron Kasulu (Kigoma) was very short and weak in staple and inferior in colour, quite the poorest sample of cotton received as representative of that in a district of the Territory. As regards the 10 samples from selections, received from Bagamoyo, Shinyanga and Mwanza, only one from Bagamoyo was found to be worth saving. It should be added that a sample of cotton from the Rufiji district, sent to a Liverpool broker by the Cotton Specialist, was classified as possessing very good colour

and a regular and strong staple of $1\frac{3}{16}$ inches, and valued at 200 to 250 points on, with current month futures at 13·52d.

15. *Examination at the Imperial Institute.*—For the crop of 1921-2, twenty-six samples from the Lindi, Morogoro, Mwanza and Rufiji Districts were sent to the Imperial Institute for examination. The four samples from Lindi showed considerable variation in strength and length of staple, and contained an appreciable amount of immature fibre; one sample belonged to a kind that would by selection furnish a valuable cotton, excellent in type and well suited to the requirements of the Lancashire market. All five Morogoro samples exhibited degeneration, and the chief defects were irregularity in length and strength and the presence of immature fibre. The nine samples from Mwanza showed likewise degeneration; the variations in strength and length were even more pronounced than in the Morogoro cottons. In the case of that from Rufiji, six out of eight samples were clean, of satisfactory strength, and of good but rather irregular length of staple; and the opinion is given that careful selection of the cotton from which the good samples came would probably produce cotton of excellent quality. The best samples of all were sent from the Rufiji District; and it is evident that ample material exists there for the production of good cottons by selection.

16. An interesting and important phase of the extension and improvement of native crop production is receiving assistance in the Moshi District, where the native is being actively encouraged to take up coffee growing or to increase and improve the area where this has already been begun by him. This encouragement is being given chiefly by the provision of nurseries of well-grown plants, instruction, and the ensuring of a market for the coffee produced. Appendix II gives figures showing details of progress in this industry, which indicate that plantings in 1922 almost equalled the number of trees existing already from the beginning of coffee growing by the native. It may be recorded here that German statistics (*Der Pflanzer*, X, 1914, 360) show that the number of trees (bearing and otherwise) in non-native plantations in Moshi increased from about 108,000 in 1907 to about $4\frac{3}{4}$ million in 1914; but the European planters there now estimate their total number of trees at about one million.

MARKETING IMPROVEMENT AND EXTENSION.

17. Work for the improvement of methods and extension of facilities for marketing has chiefly consisted in the supervision of ordinary cotton markets and buying, and the holding of cotton auction markets in the Morogoro and Rufiji Districts and the Mikindani Sub-district of Lindi. As has been reported already, the selling of native-grown cotton at auction markets conducted by Agricultural Officers has so far been very successful. The special value of these markets to the native grower is that he obtains a fair price, that he is paid in cash which he is certain to receive on the day that he brings in the cotton, that he gets a fair return for trouble taken in grading, and that he has no direct dealings with the buyer, the Agricultural Department acting as intermediary on his behalf. After it has been ensured that the loads brought in

have been properly graded (sorted), they are made up into lots of a size suited to the convenience of the buyers, and after sale at auction the producers are paid on a parity of the prices received at the same. There is every sign that this method of sale is leading to great encouragement. A summary of the conditions and statistics of the different markets is given in the following paragraphs.

18. *Morogoro Cotton Markets.*—Auction markets were held at Morogoro and Kilosa, and native seed-cotton was bought at Ngerengere by Messrs. Rosehaugh & Co. at their ginnery. The total figures were as follows :—

Centre.	1st Grade kgs.	2nd grade kgs.	Both grades kgs.	Value Shs.
Morogoro	18,724	60,822	72,546	35,014·15
Kilosa	7,757	56,176	63,933	26,549·89
Ngerengere	2,289	3,726	6,015	1,858·90
TOTALS	28,770	120,724	149,494	63,422·94

The following table indicates the fluctuations in selling price at the auction markets :—

Centre.	Cts. per keg. maximum.		Cts. per kg. minimum.		Cts. per kg. average.	
	Gr. I.	Gr. II.	Gr. I.	Gr. II.	Gr. I.	Gr. II.
Morogoro	54	50	43	40	49	43
Kilosa	53	47	41	36	46	40

19. *Rufiji Cotton Markets.*—All native cotton was sold at auction markets as follows, the figures for 1921 (not for auction markets) being given for comparison :—

Market.	1921, kgs.	1922, kgs.
Mtanza	90,233	104,363
Kilimani	201,700	171,345
Mtanange	16,371	15,201
Mohoro	15,858	80,366
TOTALS	324,162	371,275

The great increase of output in the Mohoro sub-district is noticeable, and this all the more on account of the circumstances that in the hill country of this sub-district, constituting a large proportion of its area, all crops failed to such an extent as to cause a serious shortage of food. In all, 14,700 natives were paid Shs. 111,115 at the auction markets for this seed-cotton; and this money received by them not only enabled many to pay their tax, but provided them with the means of buying food, in the circumstances of the shortage to which allusion has just been made. The prices paid at the auction markets varied from Shs. 0·48 to Shs. 0·26 for first grade, and Shs. 0·41 to Shs. 0·20 for second grade cotton.

20. *Mikindani Cotton Markets.*—During a visit of the Director it was decided that, although it would not be advisable to hold cotton auction markets in the Lindi sub-district this year, on account of the extent to which crops were already mortgaged, the system might well be introduced into the Mikindani sub-district. In accordance with this decision, three cotton auction markets were held, the two last by the Administrative Officer in Charge, as no Agricultural Officer could be spared for the purpose after the markets had been organized (an Agricultural Officer being sent temporarily for the purpose) and the first one held; the third auction market was actually asked for by native growers themselves. The total amount of cotton bought at these markets was 6,007 kgs., and the prices paid fluctuated between Shs. 0·52 and Shs. 0·48 per kg. for first grade cotton, and remained at Shs. 0·30 for second grade. The total amount paid to natives for cotton at auction markets was Shs. 2,915. The prices paid and the promptness of payment have given much encouragement for cotton growing in this sub-district; and there is no doubt that this sense of encouragement has spread and that (as is stated by the Senior Commissioner) the system might well be tried throughout the District.

21. *Mwanza Cotton Markets.*—After discussion of the matter with the Senior Commissioner, it was decided that ordinary cotton markets, regulated by Government and managed by the District Agricultural Officer, not auction markets, should be held. For a short time, during the organisation of the markets, the District Agricultural Officer was assisted by the Senior District Agricultural Officer, Bagamoyo, the arrangement being made that the latter should visit Mwanza when returning from leave, before taking up work at Bagamoyo. The amount of native cotton sold at these markets was 425 tons, or about 40 per cent. of the native crop; and prices varied from Shs. 0·22 to Shs. 0·61 per kg. for first grade cotton, and from Shs. 0·09 to Shs. 0·28 per kg. for second grade.

22. *Kilwa Cotton Markets.*—During a visit of the Director to this district, where no Agricultural Officer is stationed, it was found that it would not be feasible to hold cotton auction markets; the cotton markets were, therefore, of the ordinary kind, and supervised by the Administrative Department; they were held at Kilwa and Kibata, seed-cotton at Liwale being sold on contract. The complete details of the production, which was all native, are as follows :—

Locality.	Grade I. kgs.	Grade II. kgs.	Ratspoilt. kgs.	Total. kgs.
Kilwa	4,281	9,576	751	14,608
Kibata	31,675	5,399	1,572	38,646
Liwale	1,793½	281½	—	2,075
TOTAL	37,749½	15,256½	2,323	55,329

Of the 38,646 kgs. of cotton sold at Kibata, 12,406 kgs. was bought by Kikanda ginnery at contract prices. The amount of cash paid altogether to native owners for cotton was about Shs. 20,000.

23. *Market for Mahenge Cotton.*—This was at Kilosa, the cotton from Mahenge coming usually on the market at the same time as the Kilosa cotton, or being sold by arrangement with a European planter made by the District Agricultural Officer, Morogoro. The total quantity of seed-cotton thus sent to Kilosa was 20,655 kgs., of which 8,655 kgs. was grown by natives and 12,000 by an Indian planter. A report on native cotton growing by the Administrative Officer in Charge, Mahenge, shows that the former figure

does not give an indication of the possibilities of this industry in that district, as there is a strong suspicion that much seed was left unplanted and much cotton unpicked, and the distance of the chief producing area, between the Ruaha and Kilombero rivers and on the Kilosa road, from Kilosa on one side and Mahenge on the other, discourages the taking of more than one load to market, and renders constant supervision of production impossible. (See also paragraph 14.)

24. *Grading at Cotton Market.*—In all the chief cotton growing districts, work has been conducted with energy of purpose toward obtaining efficient cleaning and grading of cotton from every grower, the grades being at present two: (1) clean, white cotton; (2) all other merchantable cotton. In the existing early stage of this work, it has been necessary for the grading to be done largely at the markets, after the cotton has been brought in; but all efforts are being made toward ensuring that the seed-cotton will in future be adequately cleaned and graded (sorted) by its owner, where it is grown, so that improved cotton will be turned out and work at markets hastened and simplified. The teaching of proper cleaning and grading has been materially assisted in the Morogoro District by the provision of prizes at the cotton market centres of that District (Morogoro and Kilosa) by a European firm for quantity produced and quality together, for highest production of first-quality cotton, for highest proportion of first-quality cotton, and for quality alone. It may be said for all districts that the simple grading (sorting) that has been attempted so far has been readily and successfully taken up and performed by native growers; and that it is considered that little difficulty will be experienced in regard to this matter, as long as discrimination is exercised by the giving of the highest prices for the better grade.

25. *Grading at other than Cotton Markets.*—The only one of these in which the Department was actively interested directly was the copra and gum copal auction market at Bagamoyo. Here, no grading is enforced, but sellers are learning that it is profitable to dispose of their best produce separately from the rest; and original opposition on the part of buyers has turned to keen support. The auctions for copra and copal were conducted respectively in the six months July to December and the two months November and December; and the amounts and value sold by auction during these periods were: Copra, 175,795 kgs., worth Shs. 56,306; and gum copra, 12,531 kgs., value Shs. 11,400.

WORK IN STATIONS, GARDENS AND PLOTS.

26. Two Agricultural Stations were opened for work during the year; these are the stations used already by the German for agricultural work at Morogoro and Mpanganya; no others of the German stations were reopened, the chief of them, Miombo (Kilosa) and Mahiwa (Lindi), being leased for planting until such time as they can be staffed or disposed of, as may be decided. The experimental work at the two agricultural stations was of course mainly concerned with cotton, although other crops were given

attention as far as feasible. The work of restoration of the Botanic Gardens, Dar es Salaam, begun in the previous year, was continued. Plots for the trial and dissemination of introduced plants or varieties, for cotton trials, or for demonstration, were opened and worked, either by or with the assistance of the Department of Agriculture, at Moshi, Tabora, Tanga, Bagamoyo, Mahenge and Lushoto. These agricultural stations, gardens and plots are dealt with in detail in the succeeding paragraphs.

Morogoro Agricultural Station.

27. *Cotton Varieties.*—Those sown were Cambodia (from Madras), Zululand Hybrid (from South Africa), Bancroft, Durango, Early King and Columbia (from the United States of America), and Nyasaland Upland. Except in the case of Cambodia the seed gave only a few plants, whose progeny, where seed is sufficient, will receive experimentation in 1923. The Cambodia, sown in six one-tenth acre plots at 3 feet by $2\frac{1}{2}$ feet, grew hardily and well, with less attack from pests than any other cottons, and yielded seed-cotton at a rate of 270 kgs. to the acre. Observations by the Entomologist have confirmed the existence of a special resistant power of this cotton in regard to insect pests; but its susceptibility to attack by the cotton weevil (*Apion xanthostylum*) is not much less than that of other cottons. Examination of the lint showed a length of only about 1 inch in staple. (See also paragraph 39.)

28. *Cotton: Time of Sowing.*—Plots of one-twentieth acre, of the ordinary cotton of the district (upland), were sown in duplicate every fortnight from February 6 to April 17, twelve plots being planted altogether, all with the same seed, conditions of soil, and cultivation. The best results were unmistakably obtained for the sowings during the latter half of February; but the time of best rainfall shifts to such an extent from year to year, and the weather conditions at any one time vary so considerably from area to area in the district, that the conclusion has been reached that such experimentation can indicate little that is useful, even if it were repeated a considerable number of times.

29. *Cotton: Distance of Sowing.*—Four similar plots of one-tenth acre each, of the ordinary cotton, were sown at the same time with the same seed, the distances between the rows being the same in all, 3 feet, the plants in the different plots being, however, 9, 12, 15 and 18 inches apart in the rows. The respective crops of seed-cotton were $14\frac{1}{2}$, $27\frac{1}{2}$, 17 and 15 kgs. No definite conclusion can be drawn from one season's experiment, especially as the plot of widest sowing suffered from the accidents of poor germination and attacks of pests; but it is of interest that the plants were weak and the bolls small in the first two plots, normal healthy growth with normal bolls only beginning to be obtained where the distance had been increased to 15 inches in the rows.

30. *Cotton: Purity of Seed.*—Examination of the ordinary seed sown in the District (upland, descended from seed from Uganda and Nyasaland) showed that five kinds could be found in any sample: (1) black, naked; (2) seed with green fuzz; (3) seed with a normal quantity of white fuzz; (4) seed with cream fuzz; (5) seed with an abnormal quantity of white fuzz. Enquiry was made for the purpose of determining whether the variation was inherent, or due to the presence of different types, by picking out the various kinds, sowing them (on February 25) separately, and determining

the percentages of the different sorts in the resulting seed as the averages of five counts. The results were as follows:—

Type of Seed.	Result in Percentages.	
(1) Black, naked	No. 1 ...	49
	„ 2 ...	5
	„ 3 ...	26
	„ 4 ...	16
	„ 5 ..	4
(2) With green fuzz	„ 2 ...	43
	„ 3 ...	11
	„ 4 ...	38
	„ 5 ...	3
	„ 1 ..	5
(3) With normal white fuzz	„ 3 ..	52
	„ 4 ...	39
	„ 5 ...	6
	„ 1 ...	3
	„ 2 ...	0
(4) With cream fuzz	„ 4 ...	52
	„ 5 ...	1
	„ 1 ...	5
	„ 2 ...	6
	„ 3 ...	36
(5) With abnormal amount of white fuzz	„ 5 ...	51
	„ 1 ...	0
	„ 2 ...	0
	„ 3 ...	0
	„ 4 ...	43

The high proportion of seed with cream fuzz (4), apparently coming from seed with green fuzz (2), may be partly due to the difficulty of deciding whether a fuzz was green or brown, caused by staining; further, some of the cream (4) from (3) and (5) may be stained whites. The kinds (3) and (4) would appear to show association, on the results of the sowings (1), (2), (3) and (4); but the results of sowing (5) indicate that this is not a true association, but arises from confusion caused by the difficulty of separating seeds with cream fuzz from that with stained white. It is noticeable that (1), (2) and (5) do not appear in number except where they have been sown. A further matter of interest is that all the seeds from the sowing of (5) showed an abnormal amount of fuzz and that these seeds were in themselves larger than the other kinds. As far as the experiment has gone it would appear to indicate that the seed is a mixture of at least four different types: black, naked; with green fuzz; with white or cream fuzz; and with an abnormal amount of fuzz. But further trial may show that seed with normal white fuzz may be separated from seed with normal cream, giving five types in all.

31. *Simsim: Cultivation Experiment.*—This consisted of a comparison of the results from broadcasting the seed with those of sowing it regularly. For the trial, seed was sown in drills 3 feet apart, and the seedlings later thinned to 8 inches, in separate one-tenth acre plots, on February 23 and March 4; and two exactly similar plots were broadcasted thickly on the same separate dates. In each case the first-sown plot was reaped on June 28, and the second-sown on June 29, the seeds having taken 13 days for full

germination in the first sowing, and 12 days in the second. The results were as follows :—

How sown.	Habit of growth.	Yield, kgs.	Remarks.
Drills, 3 ft.	Luxuriant	11	Aphid and mildew attack.
Scattered	Thin and upright ...	18	Healthy.
Drills, 3 ft.	Luxuriant	20	Aphid and mildew attack.
Scattered	Thin and upright ...	34	Healthy.

The drilled plots were carefully cultivated, and weeds taken out as soon as they appeared; whilst in the broadcasted plots the simsim was allowed to grow up with the weeds until about a foot high, when the worst of the latter were pulled roughly by hand. As is indicated in the table, the best results have been obtained by broadcasting the seed, in spite of the fact that the plants from this method of sowing received little cultivation and weeding. The plants in the broadcasted plots showed the further advantages of healthiness and ease of reaping; the latter because they were unbranched and produced their seed at the top; whereas those in the drilled plots exhibited much more active growth, which apparently weakened them and made them susceptible to attacks of plant lice and mildew.

32. *Castor Seed : Variety Trial.*—This was made with a variety from Cyprus, small in size and possessing a high oil content. The plants, raised 6 feet apart, grew well and flowered, but did not at first set seed although thoroughly pruned; they had, however, begun to flower and fruit profusely at the height of the dry season. This variety of castor plant appears to be suitable for sowing in the Morogo District.

33. *Maize : imported kinds.*—Hickory King and Natal 8-row were grown for comparison and distribution of the seed. Trials with the best seed produced will be continued.

34. *Millets.*—The dwarf, early maturing kind called Proso, sown in the first greater rains, gave only miserable plants about one foot high which were attacked thoroughly by insect pests; a further trial was being made, for a short-rain crop. The native varieties of millet (*mtama*) under trial, namely Karachi (white, hard-seeded, export kind), Gyberi (large white, soft-seeded), Gobero (large brown, soft-seeded, used for making the native beer called *pombe*), were all sown on February 8, the first two being reaped on July 15 and the last on July 20; they yielded respectively at the rate of 816, 696 and 651 kgs. per acre.

35. *Beans.*—A small, white, bush Lima bean (belonging to the kinds collectively known to the Swahili as *maharagwe*) showed itself well suited to the conditions of the district. A first sowing of the Tepary bean, from the United States of America, did not germinate; but a second lot of seed germinated well in the lesser rains, and results were being awaited. A trial of woolly pyrol, or green gram (grown in the Territory under the name of *chiroko*) gave a yield at the rate of 300 kgs. per acre.

36. *Tobacco : variety trials.*—Both native-grown and European-grown (chiefly Virginia types) tobaccos are successful in the District; trials of other varieties were therefore undertaken at the Station, with the object of introducing more valuable kinds. These trials were made with the Turkish tobaccos Smyrna, Cavalla and Samsun, and in the case of the first two were duplicated by a successful tobacco planter at Kiroka in the Morogoro Subdistrict. They appear to show so far that these tobaccos, with the possible exception of Samsun, are unsuited to the conditions of the district owing to weakness of constitution; the sowings were made in December, 1921, and June,

and it is intended to make a further trial with sowing in March. Experiments have also been begun with the native tobacco *Nicotiana rustica* for producing leaves with high nicotine content for the use of manufacturers of insecticides.

37. *Orchard and nurseries.*—Most of the citrus fruits in the orchard are of poor kinds, and need replacing; arrangements were made near the end of the year for disposal of the fruit that is produced in quantity by sale on an organised plan, thus making wider use of it than in the past and increasing revenue. Among introduced plants (besides those mentioned already), several of which received nursery trial, success was obtained with osier (*Salix viminalis*) and *Jacaranda ovalfiolia;* fair success with wood oil (*Aleurites montana*), tung oil (*A. Fordii*) and gemsbok bean (*Bauhinia esculenta*, a bean yielding native food, animal feed and an edible oil); and failure with miraculous berry (*Synsepalum dulcificum*), a native of West Africa, the fruit of which has the property of making, for several hours after it has been chewed, everything eaten or drunk taste sweet.

Mpanganya Agricultural Station.

38. *Cotton : seed selection.*—An area of 33⅓ acres of the ordinary cotton of the district (Upland) was grown in order to provide material for seed selection, the seed being sown at three feet by 18 inches and seedlings thinned to two in a hole. The work was begun too late for selection of seed for sowing. seed better than that sown ordinarily was, however, obtained by selecting it from specially chosen fields of good, even plants belonging to native growers. During growth rogue plants and plants of inferior type were removed. On the arrival of the Cotton Specialist of the Empire Cotton Growing Corporation, Mr. R. C. Wood, in August, the area was used by him for the work of selection; 5,300 kgs. of seed from early main pickings was also obtained for further planting.

39. *Cotton varieties.*—Those tried were Cambodia and Zululand Hybrid. The former was grown from the same lot of seed as that used at Morogoro, and gave a very low yield per acre, owing to poor germination; but individual plants showed results similar to those at that Station (par. 27), and gave seed-cotton with a seed percentage of 34·2, as against that of 30·0 for ordinary cotton. A Broker's Report (Liverpool) on a sample of the cotton grown, obtained by the Cotton Specialist, showed that its staple is short and inclined to be rough; further, it was not considered that this is a satisfactory type for Tanganyika, especially as better types can be produced in the Territory, and attention was drawn to the danger of mixing and consequent lowering of the value of the better kinds, if it was grown to any extent. The other variety, Zululand Hybrid, was a failure when compared with Cambodia grown under similar conditions. It should be recorded that five varieties of Upland cotton, Lone Star, Durango, Columbia, Acala and Trice, were received from the United States; but through late arrival and drought, only one was conserved for future sowing.

40. *Cotton : time for sowing.*—The experiment was conducted on the same lines as that at Morogoro, in duplicate plots of 1/40th acre from March 5 to June 20. It received interference from a very dry April, but indicated generally the advantage of early sowing (see paragraph 28).

41. *Cotton : distance of sowing.*—The trials were on lines similar to those at Morogoro; but severe dry weather in April damaged the growing plants to such an extent as to render the experiment useless for record.

42. *Cotton : purity of seed.*—An experiment similar to that at Morogoro (par. 30) was devised; but was not carried out with the thoroughness of the

trial at that Station. Two types, only, were separated for sowing: black naked seed with green fuzz, actually Morogoro types (1) and (2); the original unselected seed contained 8 and 2 per cent. of these respectively. When pure black was sown it gave 42 per cent. of its own type, 47 per cent. of seed with white or cream fuzz and one per cent. of seed with green fuzz, and similarly seed with green fuzz gave 52 per cent. of its own type, 43 per cent. of cream-fuzzed seed, and two per cent. of black seed approximating to naked. Thus the results, as far as they go, are very similar to those at Morogoro; and point to the same broad conclusions.

43. *Maize: imported kinds.*—Hickory King, Natal 8-row and Iowa were grown for comparison and distribution of the seed; they made fair growth, but the plants were largely destroyed by wild pig and elephant at night, in spite of the employment of watchmen.

44. *Beans.*—Bush Lima gave fair results; but Tepary failed in the dry weather, although it is regarded as a dry season crop. Cowpeas succeeded admirably as a smother crop; and the gemsbok bean was fairly successful in the nursery.

Botanic Gardens, Dar es Salaam.

45. *Restoration.*—This was begun in the latter part of 1921, when the work was taken up of repairing the effects of seven years' neglect and of unavoidable destruction during the war; the chief damage had been done by the removal of many plants, especially shrubs, for making a field of fire, the digging of fire trenches, and neglect leading to the disappearance of paths, hedges and borders; about 140 species of plants can be traced as having been destroyed or allowed to perish. The first stage in the work of restoration has been to repair the effects of war and to begin active nursery work, including the collection and propagation of planting material needed or not represented. To this end, the nursery, improved by remaking of the beds and manuring, contained over 3,700 plants, of which about 2,800 belonged to species of decorative interest, whilst the remainder were those of economic kinds. Among the kinds imported from other countries those of chief interest were wood oil (*Aleurites montana*), Tung oil (*Aleurites Fordii*), cocaine plant, Sampson tangelo, miraculous berry (par. 37), and three Nymphaeas and Victoria regia brought from Kew by His Excellency the Governor. The total importations comprised 50 species, of which 30 belonged to economic and 20 to decorative kinds; and fair success was obtained in most cases. Nursery work in general at the Gardens is rendered difficult by the inadequate supply of water and its brackish nature. Other work for the improvement of the Gardens has included the removal of diseased and dead trees, the mulching of those that remain, the planting of hedges and of borders, and of grass, the thinning of trees growing too closely together, the restoration of the obliterated paths and boundaries with the help of the German plan of the area, and the renovating and rewriting of 254 permanent labels.

46. *Other work.*—The duties of the Head Gardener have been concerned also with the care of Government House Grounds and of trees in streets and Government compounds. Distribution from the area under his care has naturally been small so far: plants, 51, bundles of cuttings, 11, packets of seeds, 33. As is indicated above, the removal of the headquarters offices of the Department to the Agricultural Building in the Gardens has enabled to be carried out more efficiently the work of seed distribution, fumigation and exchange with other countries, and that under the Coconut and Plant Import Regulations. Time will increase the value of this proximity, and diversify the uses of the Gardens.

Agricultural Plots at Moshi.

47. *Old Moshi Plot.*—Four kinds of soy beans, green, white, brown and Magali, gave respectively yields of 113, 55, 72 and 30 kgs. per acre; whilst the similar returns from Canadian Wonder beans and butter beans were in order 114 and 225. None of these results were good. Trials were also being carried out with small red chillie and perilla seed (from the Imperial Institute), but these were not complete.

48. *Miscellaneous Plots.*—Madagascar butter beans and Canadian Wonder beans, produced at Kiboscho and Marangu by European and native planting respectively, yielded at the rate of 790 and 198 kgs. per acre.

49. *Cotton Plots.*—The trials were made in two experiment plots at Weru Weru and Kikafu, south of Moshi, and two co-operative plots at Kileo and Kifuri worked by natives in common; the results were as follows :—

Plot.	Seed-cotton, kgs. per acre.	Stained cotton, per cent.
Weru Weru	92	11
Kikafu	173	17
Kileo	891	5
Kituri	376	13

At Kileo the cotton possessed an outstanding strong, healthy growth; and as is seen gave a yield that is remarkably high. All the seed-cotton was sold locally at Shs. 0·50 per kg. (See also paragraph 14.) It is of interest that cotton was also grown by a Masai chief, at Himo, in the district, with fair results.

Agricultural Plot at Tabora.

50. This was abandoned, on account of its unsuitability for agricultural work.

Cotton Plots at Tanga.

51. These were opened in different parts of the District by the Senior Commissioner, Tanga, and were given supervision later by the Plant Import Inspector, stationed at Tanga; their positions were Daluni, Moa, Marimba, Gombelo, Pongwe, Ngomeni, Muheza, Mahengo, Tongoni and Mnyusi. Before the arrival of an Agricultural Officer, the work in the plots could be given little supervision; so that the figures of the yields obtained are of small value. The report received regarding the experiments, coupled with the results of the examination by the Cotton Specialist of samples of seed-cotton from most of the centres (paragraph 14), indicate at present that Mnyusi, Muheza, Moa and Ngomeni are the most promising localities for cotton, although with greater care for the trials, other localities, such as Marimba, Pongwe, Mahengo and Tongoni might show success.

Cotton Plants at Bagamoyo.

52. These consisted of co-operative (communal) plots in the south of the district, and were intended for teaching cotton growing and demonstrating its profitable nature, rather than for obtaining figures of yield. The seed cotton from these plots sold well at Bagamoyo and Ngerengere. (See paragraph 61.)

Cotton Plants at Mahenge.

53. These were worked in the same way as those at Bagamoyo (paragraph 52), but by the Administrative Officer in Charge, with one instructor. Particulars of the quantity of cotton that came on to the market from them, and of its quality, are given in paragraphs 23 and 14.

Cotton Plots at Lushoto.

54. As at Mahenge, the work in these plots had to be carried out by the Administrative Officer in Charge; they were made at Mashewa, Mombo, Korogwe, Ndungu, Kiswani, Kithurio and Vugiri, at altitudes between 1,500 and 2,000 feet. A general report, without detailed figures, makes it appear that the results were very poor, except at Vugiri; this was doubtless due to some extent to unavoidable lack of supervision of the work. The seed-cotton, amounting to 770 kgs., was sold to a ginning firm at Moshi at Shs. 0·50 per kg., the amount payable to producers being Shs. 330. (See also paragraph 14.)

Government Plantations.

55. Although they are not experiment stations, certain Government plantations are maintained from Agricultural funds. Those receiving provision in this way were:—Miombo plantation, Kilosa; Kwamkoro coffee plantation; Kihuhui sisal plantation; coconut plantations at Dar es Salaam, Bagamoyo and Pangani; and a small coffee plantation at Lushoto.

PROGRESS OF THE CHIEF EXPORT CROPS.

Cotton.

56. This is dealt with first as the chief cash crop of the territory. The output in pounds for last season and the season just ending was as follows:—

District.	1921–2.	1922–3.	Difference per cent.
Morogoro	1,039,257	848,304	– 19
Mwanza	322,080	1,222,025*	+279
Rufiji	320,927	269,493	– 16
Lindi	798,346	218,032	– 73
Bagamoyo	9,389	77,504	+725
Kilwa	92,295	39,796	– 57
Dar es Salaam	348,694	152,080	– 57
Moshi and Lushoto	—	7,929*	—
Pangani	—	4,950	—
Totals	2,930,988	2,840,113*	– 3

* Partly estimated.

This means an output of 7,327 bales of 400 lbs. for the former season, as against 7,100 similar bales for the latter. The conditions in the different districts are dealt with in the succeeding paragraphs.

57. *Morogoro.*—The total output from ginneries was 870,487 lbs. of lint; but 22,183 lbs. of this was brought from Bagamoyo District (paragraph 61); so that the whole output from Morogoro District (including the small quantity from Mahenge, paragraph 23) was 848,304 lbs. of lint. Of this 98,666 lbs. of lint (paragraph 18), or 12 per cent., was native-grown.

58. *Mwanza.*—Here, the largely increased production was caused by a strong sowing propaganda, together with favourable weather.

59. *Rufiji.*—Notwithstanding a very largely increased seed distribution, especially in the Mohoro sub-district, the output fell on account of dry weather, the latter condition being sufficiently serious in some areas as almost to cause famine. Comparison of the figures in paragraph 19 with those in the table in paragraph 56 show that about 24,000 lbs. of plantation lint was ginned.

60. *Lindi.*—Three causes had chief influence in regard to the very greatly decreased production: (1) lessened sowing and care, on account of the unfavourable markets of the previous season; (2) the loss of early-planted cotton through rains at ripening time; (3) the damage done by a very severe plague of rats. Of the total production, 54,432 lbs., or 25 per cent., was native.

61. *Bagamoyo.*—The encouraging increase was brought about by a strong cotton sowing propaganda and close instruction of growers all through the planting season, together with increased production on the part of one of the Missions. Of the total output of lint, bought in seed-cotton at Bagamoyo (55,321 lbs.) and Ngerengere (22,183 lbs.), 56,858 lbs., or 73 per cent., was native-grown.

62. *Kilwa.*—The causes of the greatly decreased production were similar to those in Lindi. The discrepancy between the market and ginnery figures is probably largely due to using one factor (0·3) over all for representing the marketed seed-cotton as lint.

63. *Dar es Salaam.*—The figures given represent more than the production in the district, as seed-cotton reaching the Dar es Salaam ginnery from other districts is included. Actual native production was only 379 lbs. of lint, chiefly on account of very dry weather.

64. *Moshi.*—This comprises the small quantities of lint produced in Moshi (7,421 lbs.) and Lushoto (508 lbs.), and dealt with at a ginnery at Moshi.

65. Of the small productions of Mahenge (13,633 lbs. lint marketed), Kondoa Irangi (Mkalama, about 2,700 lbs. lint) and Shinyanga (about 20,000 lbs. lint), the first is absorbed at Morogoro, and the two last reach Mwanza.

66. *Groundnuts.*—The chief outputs for export, in tons, were as follows:—Mwanza, 4,622; Tabora, 4,062; Lindi, 1,051; Bukoba, 748; Dodoma, 532; and Kondoa Irangi, 285. The season was generally favourable, but the crop fell below its estimate in more than one instance.

67. *Simsim.*—This was exported chiefly from Lindi, Mwanza and Kilwa, the respective amounts being 1,433, 442 and 368 tons. Rufiji shipped 105 tons.

68. *Cotton Seed.*—Lindi had the greatest export, with 996 tons. It was followed by Morogoro with 800 tons and Mwanza with 44.

69. *Millets.*—The chief export of millets (*mtama*) was from Lindi, 5,888 tons. Rufiji exported 1,564 tons. Grains from Dodoma, chiefly millet and bajri, were 6,135 tons*; and from Kilwa, 2,697 tons.

70. *Rice.*—Mwanza and Morogoro led, with 895 and 857 tons respectively. Rufiji followed with 587 tons.

71. *Beans.*—Morogoro exported 257 tons and Mwanza (chiefly *chiroko*: see paragraph 35), 129 tons.

72. *Coffee.*—By far the greatest quantity, 2,900 tons, came from Bukoba, where it is mostly native-grown. The amount from Moshi, Arusha and Usambara, exported through Moshi and Tanga, was 1,368 tons, of which 750 and 200 tons were estimated to be produced in Moshi and Arusha.

73. *Sisal.*—Tanga had the outstanding export of 9,178 tons. That from Lindi was 8 tons, but will doubtless quickly increase.

74. *Copra.*—Tanga and Bagamoyo came first, with 1,486 and 1,141 tons respectively. The remaining producing areas of importance, Pangani, Kilwa and Lindi, exported 524, 375 and 95 tons.

75. *Gums.*—By far the largest export of gum animi (Zanzibar copal) was 58 tons from Bagamoyo; Lindi also shipped 7 tons, and 16 tons went from Mohoro; a small quantity also comes to Dar es Salaam from that district and Rufiji. The chief export of gum arabic was from Mwanza, 369 tons.

76. *Raw Sugar.*—Mohoro, Morogoro and Bagamoyo were the chief exporters of *gur*, 54, 53 and 29 tons, respectively.

CONTROL OF PLANT PESTS AND DISEASES.

77. This was concerned mainly with the investigations of the Entomologist; the fumigation of cotton seed in the districts of Dar es Salaam, Morogoro (except Kilosa) and Mwanza (the first time for this district); the pulling and burning of all cotton at the end of the season, as well as the burning of all residues, the inspection of ginneries, the teaching of the means of destruction of pests in field and store, and the introduction of

* Including some Kondoa Irangi produce.

legislation against insect pests and diseases and their importation. For the fumigation of cotton seed, change has been made from hydrocyanic acid gas to carbon bisulphide. Regarding pulling and burning, and any scheme for this that entails insistence on a definite date for the completion of the work, is rendered difficult by the variation in the time of the rains from season to season, whereby the time of harvesting is made earlier or delayed, and the great differences in the conditions of weather in any one season in the various areas of a district. In the districts where cotton was grown in any quantity the work was carried out satisfactorily in Mwanza, Kilwa, Bagamoyo and Shinyanga; fairly satisfactorily in Morogoro and Rufiji; and unsatisfactory (owing to lack of money after the preceding unfavourable cotton market and the consequent need of caution regarding any compulsion) in the Lindi District.

Work of the Entomologist.

78. The following condensed account is taken from a detailed report by this Officer.

79. *Coconut and sisal pests.*—A tour from Tanga to Dar es Salaam, from January 3 to February 11, showed that conditions were satisfactory, except in Bagamoyo and Konduchi, where there existed a budrot of coconuts, the latter was dealt with by the District Agricultural Officer. As regards the coconut pests, the Coconut Regulations, 1922, should assist materially in dealing with *Oryctes boas* and *O. monoceros; Rhyncophorus phoenicis*, F., is not considered serious; no important leaf pests have been observed or reported; the scale, *Aspidiotus lataniæ*, Sign., was almost confined to palms growing in unfavourable conditions. With respect to sisal, the sisal weevil, *Scyphophorus acupunctatus*, Gyl., was apparently confined to the coast, from the Kenya border to Muera, south of Pangani, and was probably introduced with the first sisal plants brought into this part of the Territory, since when it has bred uncontrolled in neglected ex-enemy properties, where its damage to the bud, followed by fungal invasion, is often seen, the commonest breeding place being, however, poled sisal bases, pointing to the usefulness of proper sanitation in preventing this insect from becoming a major pest of the plant; the coconut beetles were found breeding in decaying sisal bases, together with the predatory Hysterids, *Hololepta scissoma*, Mars., *Hister geminus*, Er., and *Placodes ebeninus*, Lew.; lastly, the scale insect, *Aspidiotus orientalis*, Newst., exists on all kinds of Agave in the Territory, but not so far as an economic pest.

80. *Cotton pests.*—On March 4, the Entomologist proceeded to his headquarters at Morogoro, where the study of these pests was begun. The cotton weevil, *Apion xanthostylum*, Wagn., so far seen only in the area between Kilosa and Mikese, and attacking the stem collar, branch bases and boll bases, appears to do greatest damage in conditions of early unfavourable weather and of neglected cultivation; and, although Cambodia cotton was thought at first to be resistant, this opinion was not justified later; preventive measures against its increase and spread are concerned with: (1) obtaining a robust cotton of early maturity; (2) good cultivation; (3) rotation with leguminous crops; (4) the cleaning of seed-cotton on the farm or plantation; (5) the existence of a unidentified small black chalcid parasitic on the grubs (5 per cent.). The cotton stem girdler, *Alcides brevirostris*, Boh., was not seen. The pink bollworm, *Platyedra gossypiella*, Saunders, whose existence is considered to constitute the chief cotton pest problem of the Territory, is nevertheless so dependent on its incidence on unfavourable conditions of planting and area that any deductions as to its general danger, from detailed observations, must be made with caution, and in the light of experience in 1922 the outlook

regarding this pest is satisfactory; its increase and spread will be best dealt with by: (1) instruction of cotton growers; (2) selection of cotton to obtain an early robust type; (3) discouragement of cotton growing in unsuitable areas; (4) destruction of crop residues in field, store and ginnery; (5) seed treatment; (6) field treatment; there is the additional consideration that the insect is parasitised to some extent by a chalcid and a braconid (unidentified so far). As regards the Egyptian cotton bollworm (*Earias insulana*, Boisd.) and *Chloridea obsoleta*, F., there was a sharp outbreak of both pests throughout the central areas in May and June, with almost total disappearance early in July and absence for the rest of the season, the former was also breeding in roselle, ochro and various wild Malvaceae, and Chloridea on its other common host, maize, increased in numbers by the fruiting of the latter just as the cotton is bolling. Outbreaks of the cotton leaf-roller (*Sylepta derogata*, F.) coincided with that of the two pests just mentioned. A matter for some surprise was that stainers (*Dysdercus* spp.) were almost negligible, as was also the lesser cotton stainer (*Oxycarenus hyalinipennis*, Costa). Among parasites of cotton pests not mentioned already there were observed the vespid *Icaria nobilis*, Gerst., predatory on the bollworms, and the reduviids *Phonoctonus principalis*, Gerst., and *P. nigrofasciatus*, St., on Dysdercus. The following is a list of the cotton insects collected by the Entomologist or submitted to his office in the past season:—

(*a*) Stem pests:	*Apion xanthostylum*, Wagn.
	Alcides brevirostris, Boh.
	Tragicoschema nigroscriptum, Fairm.
	Phenacoccus obtusus, Newst.
	Hemichionaspis minor, Mask.
(*b*) Leaf pests:	*Syagrus morio*, Har.
	Nisotra weisei, Jac.
	Aphis gossypii, Glov.
	Zonoceros elegans, Thunb.
	Sylepta derogata, F.
(*c*) Blossom pests:	*Popillia bipunctata*, F.
	Mylabris amplectens, Gerst.
	,, *kersteni*, Gerst.
	,, *dicincta*, Bertol.
	Nosognatha ruficollis, Ol.
(*d*) Boll pests:	*Chloridea obsoleta*, F.
	Earias insulana, Boisd.
	Platyedra gossypiella, Saund.
	Apion xanthostylum, Wagn.
	Calidea sp.
	Dysdercus cardinalis, Gerst.
	,, *fasciatus*, Sign.
	,, *nigrofasciatus*, St.
	Leptoglossus membranaceus, F.
	Oxycarenus hyalinipennis, Costa.

81. *Locusts, etc.*—There was no visitation of the migratory locust to the territory during the period under report. Two grasshoppers appeared in destructive numbers: *Eupropacris spectabilis*, Walk., on cinchona at Amani and native food crops throughout Usambara, from October, 1921, to January, and *Zonoceros elegans*, Thum., on cotton and native food crops over the central area, from September to February, 1923.

82. *Native Storage Methods.*—An investigation is in train.

83. *Products from Bees.*—The beeswax and honey produced in the Territory are all from wild bees; where the large areas of Ceara rubber exist the former is unsaleable through bitterness; the wax is not wanted by

manufacturers of comb foundation owing to its melting points being lower than that of wax from the hive bee. An endeavour is being made to devise a queen excluding method, such as that proposed by King in the Sudan, which will be applicable to the native makeshift of attracting wild bees to live in barrels and boxes.

84. *Legislation.*—The Entomologist has afforded technical advice for drafting Ordinances and Regulations having relation to the control of insect pests. (See paragraphs 90 and 91.)

85. *Reference Collection.*—This, begun by the Entomologist contains between five and six thousand specimens, comprising all pests in the Territory known up to the present, as well as several new to record.

86. *Publications.*—These have comprised, so far, two entomological circulars for departmental use.

87. *Economic Insects Observed.*—The numbers of these, with their host plants, were as follows, totalling 80 :—Maize, 9; groundnuts, 4; cowpeas, 6; bonavist bean, 4; simsim, 1; sugar-cane, 1; sweet potato, 6; banana, 5; sisal, 5; cacao, 1; coffee, 8; cinchona, 3; citrus, 3; mango, 3; soursop, 1; coconuts, 4; egg-plant and potato, 3; turnip, 2; physic nut, 1; guinea grass, 1; various Cucurbitaceae, 7; soapberry, 1; Hippeastrum, 1. Of these, *Alcides dentipes*, Oliv., girdling groundnuts, and *A. arcuatus*, Boh., girdling cowpeas, constitute new records of economic importance.

88. *Identifications.*—The valuable assistance received by the Imperial Bureau of Entomology has resulted in the making of determinations, and identifications of species sparingly represented at the British Museum, amounting to 673, classified as follows :—Species determined, 545; species identified and previously unrepresented at the Museum, 38; species sparingly represented and wanted at the Museum, 83; species newly described, 7.

89. *Facilities for work.*—The early stage of the work has necessitated labour of observation rather than investigation on the part of the Entomologist. Now that this officer is being provided with adequate laboratory accommodation and an insectary, greater attention to investigational work will be possible.

AGRICULTURAL LEGISLATION.

90. *Cotton.*—Legislation, rules, notices or circulars were published as follows :—

Cotton Rules, 1922, in *Gazette* for December 29, 1922.

Ginneries, as Government Notice No. 232, in *Gazette* for October 27, 1922.

Ginnery Sites and Buildings, as Secretariat Circular No. 59 of 1922.

Rat-proofing of Ginneries, as Government Notice No. 383 of November 8, 1922.

Sundry notices, as Government Notices Nos. 31, 87, 163, 218 and 272.

91. *Plant Protection.*—Legislation, rules and notices were published as follows :—

Plant Pest and Disease (Destruction) Regulation, 1922, in *Gazette* for June 16, 1922.

Plant Pest and Disease (Coconut) Regulations, 1922, in *Gazette* for September 29, 1922.

Declaration of Pests Notice, in *Gazette* for June 16, 1922.

METEOROLOGICAL MATTERS.

92. During the year the number of stations provided with meteorological equipment was brought up to fifty, and the number of independent stations supplying records was six. Readings of rainfall and of maximum and minimum temperature during the year were given by fourteen stations, and of rainfall alone by 31. Appendix III gives the monthly rainfall for the stations mentioned.

REVENUE, FINANCIAL YEAR 1921-2.

93. This was as follows :—

Fumigation of cotton seed :—

	Shs.	Total Shs.
Morogoro	437·20	
Dar es Salaam...	45·44	
		482·64
Receipts from Government Plantations :—		
Kigoma	290·00	
Lindi	1,520·00	
Kilimatinde	76·32	
Utete	426·00	
Mikindani	495·24	
Tabora	1,198·78	
Kasanga	104·10	
Mkalama	31·76	
Kilwa	500·80	
Mwanza	170·00	
Pangani	1,398·00	
Dodoma	96·46	
Lushoto	237·90	
Bagamoyo	20,459·00	
Tanga	13,469·06	
Dar es Salaam	31,626·00	
		72,099·42
Amani Institute, miscellaneous sales of produce and planting material		2,671·14
Total		75,253·20

BIOLOGICAL AND AGRICULTURAL INSTITUTE, AMANI.

94. The work has comprised chiefly the care of the Institute, with its plantations and roads, and a small distribution of planting material. (See Appendix I.) An abstract of the Report of the Directors for 1922 is given in Appendix IV.

A. H. KIRBY,
Director.

APPENDIX I.

DISTRIBUTION OF PLANTING MATERIAL, 1922.

Economic Plants (Including Fruit Plants) :—

Cotton Seed	665,280	lbs.
Groundnuts	22,322	lbs.
Maize : Hickory King	1,361	lbs.
Natal Yellow 8-row	280	lbs.
Iowa Silver Mine	30	lbs.
Chillies	980	lbs.
Coffee	480	lbs.
Rice (hill rice)	50	lbs.
Millet : Proso	20	lbs.
Other	3	packets
Simsim	10	lbs.
Wheat	1	lb.
Tobaccos	2	packets
Piper nigrum	36	cuttings
Aleurites montana	1	packet
Fruit trees and miscellaneous plants	5	packets

Decorative Plants (Including Shade and Avenue Trees and Wingbreaks) :—

Jacaranda ovalifolia	25	plants
Poinciana regia	2	packets
Ferns	2	crates of cuttings
Miscellaneous plants	1	crate

Unclassified :—

Seeds	179	packets
Ornamental plants	1	collection
Cuttings	11	bundles
Plants, various	51	

Note.—The following unclassified items (included above) were distributed from the Biological and Agricultural Institute, Amani. Seeds, 146 packets ; ornamental plants, one collection.

APPENDIX II.

NATIVE COFFEE PLANTINGS, MOSHI DISTRICT, 1922-3.

Locality.	Trees planted previous to 1922.		Trees planted in 1922.	Total number of Trees.
	Bearing.	Not yet Bearing.		
Kibongoto	352	574	3,630	4,556
Mashame	805	5,635	10,395	16,835
Kibosho	227	3,437	10,510	14,174
Uru	29	400	423	852
Mbokomo	419	2,587	2,134	5,140
Old Moshi	350	1,185	619	2,154
Kirna	4,250	6,092	20,656	30,998
Kilema	4,797	16,070	12,890	33,757
Marangu	19,359	10,185	15,823	45,367
Mamba	2,919	5,180	5,449	13,548
Mwinka	263	1,921	2,063	4,247
Mkuu	—	—	2,499	2,499
Kirna (Rombo) ...	45	—	2,526	2,571
Mrere	—	163	84	247
Himo	2,450	—	—	2,450
	36,265	53,429		
Totals ...	89,694		89,701	179,395

APPENDIX III.

TANGANYIKA TERRITORY.—RAINFALL IN MILLIMETRES, 1922.

District.	Station.	Alt. (Approximately).	Lat. (Approximately).	Long. (Approximately).	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.
		feet.	° ′	° ′													
Arusha	Arusha	4,416	3 23	36 43	68·6	124·5	127·3	301·0	235·5	37·2	19·6	12·0	29·1	13·2	105·0	111·0	1,184·0
	Mbulu	5,900	3 52	35 37	75·6	128·4	218·3	90·5	68·5	0·3	1·1	3·2	nil	5·0	58·6	92·2	741·7
Bagamoyo ...	Bagamoyo	S. L.	6 25	38 55	0·1	0·1	252·3	59·0	213·0	37·2	16·6	14·3	8·1	48·9	88·8	68·7	807·1
Bukoba	Bukoba	3,709	1 20	31 47	66·8	94·9	87·1	335·5	274·6	149·5	49·0	50·3	118·4	61·3	85·4	180·6	1,553·4
	Biharamulo	4,350	2 42	31 26	72·1	75·2	101·3	151·4	54·8	nil	nil	63·0	84·1	33·8	65.8	174·7	876·2
	Kagondo Mission ...	4,252	1 18	31 15	61·7	182·0	84·4	175·7	183·9	108·9	11·1	37·5	67·4	78·4	56·1	132·8	1,179·9
Dar es Salaam ...	Dar es Salaam	S. L.	6 50	39 17	30·2	nil	242·5	43·7	267·3	48·1	24·6	22·8	22·1	30·1	38·2	68·9	838·5
	Msimbazi Mission ...	42	6 50	39 17	—	—	—	—	—	—	—	8·3	27·4	28·2	70·6	20·6	—
	Ruvu	118	6 48	38 45	—	–	–	—	—	—	—	—	—	80·0	76·0	33·0	–
Dodoma	Dodoma	3,693	6 11	35 46	138·9	46·8	99·7	2·3	5·7	nil	nil	nil	nil	nil	5·6	4·7	303·7
	Kilimatinde	3,500	5 50	34 55	111·6	63·3	193·5	25·7	21·3	nil	nil	nil	(Station transferred to Manyoni.)				
	Manyoni	4,300	–	—	—	—	—	—	—	—	—	—	—	–	82·4	24·2	—
	Singida	5,233	4 48	35 45	—	—	154·5	–	nil	nil	nil	nil	nil	13·0	63·7	89·7	—
Iringa	Iringa	5,233	7 47	35 37	211·4	201·8	221·1	53·2	7·1	nil	nil	nil	nil	21·9	59·7	41·9	818·1
	Malangali	4,775	8 35	30 00	202·0	135·1	246·5	19·5	nil	nil	nil	nil	nil	nil	108·5	99·7	811·3
Kilwa	Kilwa	S. L.	8 44	39 25	42·3	173·7	101·0	23·0	162·7	0·8	1·2	13·7	10·6	18·1	35·8	57·5	640·4
	Liwale	1,500	9 45	38 00	118·4	281·0	143·0	28·9	38·4	nil	nil	12·6	0·3	64·7	41·8	50·6	779·7
Kondoa Irangi ...	Kondoa Irangi	4,610	4 57	35 58	98·5	109·9	145·5	27·3	14·1	nil	nil	0·6	nil	10·8	22·1	40·0	468·8
	Mkalama	4,253	4 06	34 38	231·4	96·4	175·0	220·0	4·2	nil	nil	nil	nil	22·3	71·4	59·0	879·7
Lindi	Lindi	S. L.	10 00	39 43	75·0	186·3	76·2	43·8	28·1	15·0	4·0	2·3	11·3	6·7	61·9	130·5	641·1
	Tunduru	2,300	11 05	37 27	190·6	335·6	287·2	17·8	16·3	nil	nil	0·8	nil	25·0	98·0	77·0	1,048·3
	Masasi Mission	1,505	10 42	38 53	140·9	193·5	349·1	39·3	26·5	nil	nil	6·9	nil	26·7	42·3	155·7	980·9
Mafia Island ...	Kilindoni	63	7 55	39 45	145·0	153·0	130·0	297·0	353·0	27·0	27·0	nil	18·0	39·0	55·0	11·0	1,255·0
Mahenge ...	Mahenge	3,352	8 40	36 43	227·1	60·5	563·9	144·7	200·8	155·9	7·5	41·7	36·6	291·9	27·8	47·0	1,805·4
	Mkasu	1,308	8 52	36 03	293·0	190·5	394·1	90·5	68·4	25·7	nil	13·8	6·4	26·2	46·1	39·0	1,193·7
Morogoro ...	Morogoro	1,628	6 48	37 46	62·9	83·3	194·2	53·1	101·0	21·0	4·0	nil	nil	39·3	12·0	73·0	643·8
	Kilosa	1,606	6 48	37 01	85·6	240·1	255·7	31·3	155·3	14·6	nil	—	2·6	84·7	21·8	35·7	—
	Kisaki	423	7 27	37 42	129·2	114·2	550·4	248·6	349·8	127·7	19·2	177·4	48·8	158·9	255·3	95·0	2,274·5
	Ngerengere	641	6 47	38 08	17·6	98·9	145·8	70·3	221·5	33·9	12·1	17·4	15·9	35·9	37·7	30·2	737·2

TANGANYIKA TERRITORY.—RAINFALL IN MILLIMETRES, 1922—*continued.*

DISTRICT.	STATION.	Alt. (Approx.)	Lat.	Long.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL.
		feet.	° ′	° ′													
MOSHI	Moshi	2,649	3 22	37 22	20·0	40·0	176·0	111·0	200·0	116·0	20·0	16·0	17·0	5·8	14·7	38·0	774·5
MWANZA	Mwanza	3,709	2 32	32 53	57·4	135·5	115·7	203·3	82·6	nil	nil	75·4	25·2	91·5	115·2	109·7	1,011·5
	Musoma	3,709	1 28	33 47	51·4	47·6	192·0	110·1	96·4	2·2	4·5	34·9	28·0	34·0	20·2	20·0	641·3
PANGANI	Pangani	S. L.	5 25	38 58	4·0	nil	82·5	192·0	582·7	112·3	65·0	14·3	12·1	22·4	57·1	72·6	1,217·0
RUFIJI	Utete	327	8 00	38 45	19·6	76·1	166·3	87·2	79·3	2·4	0·4	nil	nil	43·5	83·0	23·0	580·8
RUNGWE	Tukuyu	5,069	9 15	33 38	134·6	197·6	410·0	428·8	507·7	50·2	19·7	46·3	17·6	68·6	117·0	225·1	2,223·2
	Mbeya	5,800	8 52	33 25	255·8	88·0	318·5	48·5	24·0	13·8	nil	nil	nil	74·0	63·5	149·2	1,035·3
	Itete Mission	6,540	8 56	33 12		—	597·0	-	—	—	—	2·0	1·8	94·0	166·0	303·5	—
	Kymbila Mission... ...	4,400	9 15	33 40	—	—	—	—	—	—	—	—	22·8	42·5	163·8	306·0	—
SONGEA	Songea	3,826	10 42	35 40	279·6	221·2	340·9	106·4	18·1	nil	1·8	1·4	0·6	10·1	98·4	168·9	1,247·4
	Lipumba	3,270	10 48	35 05	237·2	288·1	354·7	26·9	13·7	nil	nil	1·1	1·5	nil	105·3	127·4	1,155·9
	Milo	8,300	10 04	34 39	270·3	240·2	364·8	76·6	148·8	nil	nil	nil	nil	60·5	244·0	113·8	1,519·0
TABORA	Tabora	4,000	5 00	32 00	114·4	139·8	218·7	31·4	34·0	nil	nil	11·0	nil	29·0	82·7	126·5	787·5
	Kahama	4,055	3 35	32 33	74·7	210·2	165·0	106·4	48·6	nil	nil	nil	8·1	22·0	115·1	132·9	883·0
	Shinyanga	5,233	3 34	33 19	178·4	65·6	128·3	118·1	33·5	nil	nil	1·0	nil	(Stn. transferred to Kola'ndota.)			
	Kola'ndota Mission ...	4,400	3 34	33 30	-	—	—	-	—	–	–	—	–	8·6	36·4	117·8	-
TANGA	Tanga	S. L.	5 40	39 07	nil	10·4	96·0	221·7	673·2	158·3	52·8	51·3	40·0	27·0	144·6	16·5	1,491·8
	Mtotohovu	S. L.	4 43	39 09	—	—			444·5	2·6	5·1	94·5	1·5	0·2	3·2	1·9	—
UFIPA	Namanyere	5,100	8 00	32 00	205·8	147·0	165·8	106·4	12·5	nil	nil	nil	10·2	25·2	18·4	187·8	879·1
	Kasanga	2,630	8 30	31 00	228·1	304·2	215·8	16·1	6·3	nil	nil	nil	nil	52·9	59·2	57·5	940·1
	Mwazye Mission	5,600	8 30	31 45	222·0	254·9	247·3	21·2	5·7	11·4	nil	nil	nil	24·6	42·3	120·6	950·0
UJIJI	Kigoma	2,531	4 52	29 38	14·0	18·1	6·0	10·5	1·8	nil	nil	3·0	6·9	43·4	181·4	197·7	282·8
	Ujiji	2,738	4 59	29 48	12·1	180·6	61·9	74·5	32·0	nil	nil	38·0	14·0	39·7	112·1	100·7	665·6
	Kasulu	4,530	4 35	30 07	146·4	226·8	271·7	228·7	11·1	1·2	nil	17·1	2·8	98·0	133·9	191·4	1,329·1
USAMBARA ...	Lushoto	4,579	4 47	38 17	96·9	97·4	141·9	172·5	534·4	63·4	71·0	7·4	11·5	27·5	119·9	107·6	1,451·4
	Amani	3,004	5 06	38 38	63·8	52·6	350·9	285·9	586·8	91·6	127·5	92·2	97·1	63·6	282·7	166·2	2,260·9
	Sakare	4,500	5 00	38 25	94·1	64·0	99·3	172·0	766·5	182·6	117·0	75·0	98·6	66·1	89·9	68·5	1,893·6

APPENDIX IV.

BIOLOGICAL AND AGRICULTURAL INSTITUTE, AMANI.

ABSTRACT OF REPORT, 1922.

Establishment and General Organization.

Information as to the staff is given on the first and second pages of this Report. The Head Gardener proceeded to England, on leave, on October 7.

2. The provision for labour was increased from £750 to £900.

3. During the year, on instructions from the Director of Agriculture, extension of plantations, vegetable growing and preparation of plant products for sale were stopped, and the outdoor activity was confined mainly to caretaking and nursery work.

4. The only additions to the Library were journals received on free issue. A clearance of old and obsolete books in the Library was being made.

5. An inventory of the Chemical Laboratory was taken.

6. In December the postal and telegraphic work done so far by the Institute was taken over by the Posts and Telegraphs Department.

RESEARCH.

7. It is reported that, owing to the want of equipment, research work was severely handicapped. An investigation of the cause of gummosis of West African mahogany (*Khaya senegalensis*) is reported to have led to no definite conclusion.

PLANT INVESTIGATIONS AND RECORDS.

8. *Artemisia afra.*—Plants grown from cuttings brought from Mombo gave indications of the formation of flowers; a possible source of santonin or of a substitute.

9. *Cinchona.*—Samples of succirubra bark from five-year-old coppiced shoots, sent to the Wellcome Chemical Research Laboratories through Dr. Gallagher, Senior Medical Officer, Tanga, gave the following summary analysis in percentages, other figures of material from Amani being presented for comparison :—

	Bark from coppiced shoots. 1922.	Bark from trees. 1918 & 1920.
Moisture	9·0 to 9·5	7·9 to 8·8
Total alkaloid ...	7·0 to 7·9	8·3 to 5·8
Quinine	1·9 to 2·1	2·5 to 1·8

thus satisfying the requirements of the pharmacopeias of both Britain and the United States of America. The Wellcome report draws attention to the likelihood that succirubra bark, although its comparatively low content of quinine has led to its neglect, may become of importance owing to the fact that cinchona alkaloids other than quinine may similarly become of importance in relation to certain types of malaria. Other bark, from the Ledger

hybrid with succirubra grown at Amani, is awaiting report by Professor Greenish, of the Pharmaceutical Society of Great Britain.

10. *Sassy bark* (*Erythrophleum guineense*).—The interest taken in this bark has caused specimens to be sent to Professor Greenish for investigation.

11. *Cocaine plants.*—Specimens of *Erythroxylon Coca* and *E. novogranatense* sent to Kew and Professor Greenish showed that the collections are named rightly and that the latter is the best source of cocaine synthesized from the alkaloidal contents of the leaves, although its produce (leaves) is apparently never seen in commerce. As the collections are showing a tendency to die out they are being conserved by nursery work (paragraph 20).

12. *Maize.*—Hickory King and Natal 8-row maize, exposed to weevil, showed best resistance in the case of the flint maize, thus upholding the native preference for kinds of this type.

13. *Potatoes.*—British Queen, Express and Langworthy showed the first as the best yielder, on results from one experiment. Acclimatised kinds, a red sort from Nairobi and a white from Lushoto, gave good yields, but did not keep well.

14. *Herbarium.*—The number of sheets added was 578, comprising specimens from 97 natural orders.

15. *Work for obtaining tree records.*—It is reported that lack of materials caused slow progress to be made with a scheme for obtaining a photographic record of typical trees at Amani, with sketches and descriptions (possibly) of the microscopical structure of the wood.

16. *Record of native plant names.*—This was begun at the request of the Director of Agriculture, and a list of 576 names of plants in 111 natural orders was drawn up in Swahili, Shambala, Bondei, Nyamwesi, Nyasa, Sagara, Masai, Makuwa and Luganda.

WORK IN THE PLANTATIONS AND NURSERY.

17. *Plantations made or extended* :—

Tree.	Number.	Remarks.
Hybrid : *Cinchona ledgeriana* and *C. succirubra*	5,630	Approximately
C. ledgeriana	2,390	,,
C. succirubra	234	,,
C. robusta	70	,,
C. officianlis	45	Introduced from India.
Cedrela odorata	1,840	Approximately
C. Toona	490	,, at Sigi.
C. sp.	595	,,
Muhumulu (*Maesopsis Eminii*) ...	1 plantation	In place of Ceara rubber, removed.
Araucaria Cunninghamii ... *A. Cookii*	Small areas	Seed from Durban.

18. *Efwatakala Grass* (*Melinis minutiflora*).—Consequently upon an enquiry for seed from Zanzibar, a small plot was made from local seed.

19. *Coffee and Tea.*—Before the plan was adopted of selling the coffee on the trees (see paragraph 3), the following coffee and tea were prepared :—

	Coffea robusta.	*C. bukobensis.*	*C. Quillou.*
	Kgs.	Kgs.	Kgs.
Cleaned Coffee	645	80	155
Parchment Coffee	327	144	51

and of Assam Tea, 65 kilograms.

20. *Nursery work.*—The raising of clove seedlings, *Artemisia afra* (paragraph 8), seedlings of the two Cocas growing at the Institute (paragraph 11), maize (paragraph 12) and potatoes (paragraph 13) is reported.

21. *Observations on pests and diseases.*—No return of the locusts which attacked Cinchona in 1921 was observed, and no serious disease except that of Khaya (paragraph 7) was noted.

PLANT DISTRIBUTION.

22. This is shown in a footnote to Appendix I. Special distributions in addition consisted of 78 kgs. of Hickory King maize to employees (prizes being offered by the Director and the Head Gardener for the "best pair of ears"), and about 20 living plants and a number of seeds taken to Kew by the Head Gardener on leave. At the request of the Director of Agriculture a list of 149 kinds of seeds produced at Amani, for sale in shilling and 50 cent. packets or parcels, was prepared for publication.

METEOROLOGICAL MATTERS.

23. The rainfall and maximum temperature are given as follows :—

	Rainfall. mm.	Max. temp. ° C.
January	63·8	31·0
February	52·6	31·1
March	350·9	29·1
April	285·9	27·0
May	586·8*	25·0
June	91·6	24·0
July	127·5	22·0
August	92·2	23·0
September	97·1	23·1
October	63·6	26·1
November	282·7	27·0
December	166·2	27·1
Total rainfall	2,260·9	

EXPENDITURE AND REVENUE.

24. *Expenditure (excluding European salaries)* :—

	Shs.
Laboratory Assistant	3,375·00
Clerks	3,939·31
Artisans	4,859·50
Plants and Seeds	312·48
Library	66·00
Upkeep of Station	15,320·62
Meteorological Instruments	13·00
Transport and Travelling	565·93
Railway Fares and Freight†	366·80
Tools and Implements	1,664·82
Contingencies	965·23
Total	31,448·69

* An Amani record for the month.

† To September only.

25. *Revenue* :—

	Shs.
Coffea robusta	102·30
„ Quillou	101·60
„ bukobensis	77·50
Tea	162·60
Areca Catechu	26·00
Pepper	1·80
Rent of Government Buildings	202·00
Vegetables	219·38
Firewood	78·00
Charcoal	2·40
Plants and Seeds	205·36
Bulls slaughtered and sold	204·80
Coconuts	1·40
Sundry goods	97·00
Coffee crop on trees	500·00
Total	1,982·14

MISCELLANEOUS MATTERS.

26. The number of treatments of out-patients at the Dispensary was 2,813.

27. The number of cattle given care by the Institute was increased from 35 to 63 by the taking over of the herd at Kwamkoro. Much sickness prevailed during the year, and at the end the number was 54.